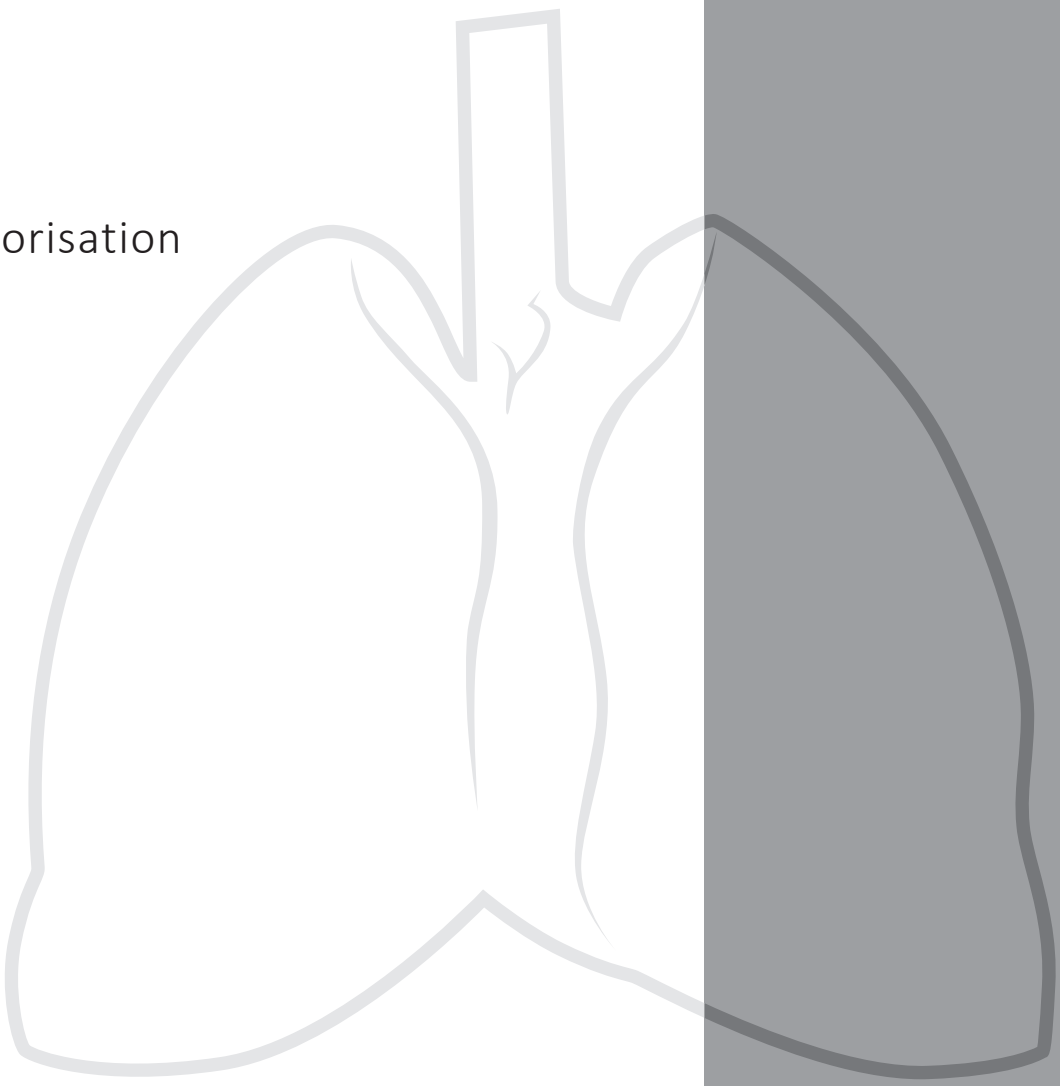
Physical functioning in patients with chronic cardiopulmonary diseases

Valorisation



Valorisation can be understood as a process of assuring that scientific knowledge can be translated into clinical practice; as an act of making research results appropriate and useful to enhance opportunities for others to use them. Knowledge valorisation, specifically, refers to the process of creating value from knowledge by making knowledge suitable and available for social and/or economic use, and/or for translation into competitive products or services, for example. The findings of the present thesis aimed to provide a better understanding of physical functioning in patients with chronic cardiopulmonary diseases. The present chapter will focus on the valorisation of these findings.

Relevance

Chronic cardiopulmonary diseases, such as chronic obstructive pulmonary disease (COPD) and chronic heart failure (CHF), are associated with high morbidity and mortality worldwide. Patients with these diseases frequently present with important impairments in physical functioning, which in turn will contribute to even higher morbidity and mortality. These findings can be further worsened by the presence of comorbidities. In the present thesis, physical functioning in patients with chronic cardiopulmonary diseases was investigated by exploring three main themes: the impact of comorbidities on relevant outcome measures in patients with COPD, including measures of physical capacity; measurement properties of field physical capacity tests in patients with COPD or CHF; and patterns of physical activity and sedentary behaviour in patients with COPD. Findings related to these themes can be of relevance from a social and economic point of view, as discussed below.

Firstly, the findings presented in the current thesis demonstrated that patients with COPD and cardiac impairments have worse physical and psychological status than those without cardiac impairments. However, comorbid conditions do not seem to preclude patients with COPD from showing significant and clinically meaningful improvements following a comprehensive pulmonary rehabilitation (PR) programme. Given the negative impact of comorbidities in patients with COPD, an active search for these conditions could prove beneficial for a better disease management, and hence a better prognosis. Potentially, this could positively impact the patient's quality of life and lead to lower health care costs. Secondly, the present thesis' findings revealed that the 6-minute walk test (6MWT) is both valid and reliable in patients with CHF, with similar results for the Timed Up & Go (TUG) test in patients with COPD. Besides, the TUG test was also found to be responsive to PR in patients with COPD. Using these simple and quick-to-perform tests to investigate the physical capacity of patients with chronic cardiopulmonary diseases, when compared to more complex tests (e.g., incremental cardiopulmonary exercise test), could facilitate the assessment of physical capacity on a broader scale, and could lead to lower costs. Thirdly, the present thesis demonstrated that detailed inves-

tigations of activity levels in patients with COPD can be useful to help delineate more successful interventions/strategies to increase physical activity and decrease sedentary behaviour in this population. Moreover, the present thesis demonstrated that having a physically active resident loved one seems to be beneficial for a more physically active lifestyle. Investing on interventions/strategies to increase physical activity and reduce sedentary behaviour, which are important modifiable risk factors, could result in a longer life with better quality of life in patients with COPD.

Target groups

Health care provides

Comorbidities in patients with COPD were the main outcome of two chapters in the present thesis. The results of these chapters highlight the importance of assessing comorbidities in this population. For example, it was shown that patients with COPD and cardiac impairments have worse physical and psychological status than those without cardiac impairments. Health care providers should be aware of the negative impact of comorbidities in patients with COPD in order to establish the best treatment available for these conditions. The present thesis also showed that 6MWT and TUG are reliable and valid physical capacity tests, which reinforces their utility in both clinical and research settings. Moreover, clinicians could use patients with a TUG time higher than 11 s as a target for therapies such as exercise training, since these patients were found to have worse physical and psychological health outcomes. It was also found that a reduction in TUG time of 0.9-1.4 s following PR was identified as clinically important. This will help researchers and clinicians in the interpretation of changes as a result of intervention trials or rehabilitation programmes. In three chapters of the present thesis activity levels of patients with COPD were investigated. The findings of these chapters are important for clinicians to help delineate interventions/strategies to increase physical activity and reduce sedentary behaviour. One important finding in all three chapters was that patients with COPD spent the majority of their time in sedentary behaviour. One way to reduce the amount of sedentary behaviour, as suggested in one of the papers, could be by increasing the amount of time in light activities, such as household activities. Another way to make patients less sedentary and/or more physically active, as suggested in another chapter, could be by supporting joint activities with physically active loved ones.

Patients with chronic cardiopulmonary diseases

Many findings of the present thesis are of interest for patients with chronic cardiopulmonary diseases. A deeper understanding of the negative impact of comorbidities in

patients with COPD was achieved. Patients should be aware of this impact and talk to their family and physicians about it in order to facilitate an early diagnosis, which would allow an early treatment and prevent negative consequences. Another finding of the current thesis is that physical capacity is an important outcome in patients with chronic cardiopulmonary diseases. Once patients have been diagnosed with the cardiac and/or pulmonary disease, many of them tend to see the primary impairment (i.e., cardiac or pulmonary dysfunction) as the main problem and cause of symptoms. The present thesis reinforces that patients should be aware that their physical capacity can be reduced and associated with symptoms, but they should also be aware that this reduction can be restored with interventions such as PR. The present thesis also demonstrated that patients with COPD are physically inactive and/or sedentary. This highlights the importance of raising awareness about the negative impact and potential consequences of a physically inactive and/or sedentary lifestyle, and about the benefits of an active lifestyle.

Industry

The vast majority of studies that investigated comorbidities in patients with chronic cardiopulmonary diseases used medical charts or self-reports. Previous studies have shown that poor agreement exists between objectively identified and non-objectively identified comorbidities. Non-objective measurements are usually preferred due to their simplicity and low cost. Therefore, the industry should work on developing new diagnosing tools that are simple to use and able to provide accurate results at reasonably low costs. Three chapters of the present thesis investigated the measurement properties of relatively simple physical capacity tests, such as the 6MWT and TUG. One of the advantages of these tests is that they mimic basic activities of daily living, such as walking and rising from a chair. Recent research has investigated the potential of devices that could be used during these tests to provide further information, such as accelerometers and gas analysers. This could be potential targets for the industry. Activity monitoring was used in three chapters of the present thesis. In two of them, activity monitoring was restricted to the leg, while in the other one activity monitoring was restricted to the arm. The industry could work on developing an activity monitor that would measure motion accurately of both upper and lower limbs. Moreover, one of the findings of the present thesis was that patients with COPD spend the vast majority of their time in sedentary behaviour. The industry could work on developing and improving technologies to control sedentary behaviour, such as an electronic television lockout system or pads to measure sitting time.

Activities and products

The findings of the present thesis were translated mainly as presentations in international congresses and publication of manuscripts in high impact journals in the field of expertise. These findings were presented at the 2013 and 2015 American Thoracic Society (ATS) International Conference; 2013, 2014, 2015, and 2016 European Respiratory Society (ERS) International Congress; and 2015 CIRO pre-ERS meeting. During both 2013 and 2015 ATS International Conferences, the abstracts submitted were granted with the International Trainee Development Scholarship. Moreover, the abstract presented at the 2015 CIRO pre-ERS meeting was awarded with 2nd place for best abstracts in rehabilitation and chronic care. The findings obtained with the current thesis also led to the publication of original manuscripts and a research letter in high impact peer-reviewed scientific journals. This thesis' findings were also presented during a summer course in 2014, and a workshop and a national congress in 2015. All the above mentioned activities allowed the findings of the present thesis to be made available to a wider public, which may provoke further discussions and be the basis for future studies on physical functioning in patients with chronic cardiopulmonary diseases.